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Smart Railway Track Change with Coach Link Cut Detection System

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Abstract:
This paper provides an advanced automatic railway track change with coach link cut detection system. It deals with three things. Firstly, it gives information about whether the train on or not. Secondly, it provides two trains running on same track then automatically track will be changed and the trains by reducing the accidents. And then, it gives all coaches or connected or not, by the presently existing system manually track will be changed and information passing to the train. So use of embedded technology by achieving this closed loop feedback control system efficient and reliable. As the system is completely automated, it avoids manual errors and thus provides ultimate safety to road users and there is not much of complexity needed in the circuit.

Keywords: GSM, PLC, PIC, ADC concept, DCS

I. INTRODUCTION

Considered as a weak point in road and railway infrastructure, improving level crossings (LCs) safety became an important part of academic research and took increasing railway undertaking concerns. Improving the safety of people and road–rail facilities is an essential key element to ensuring good operation of the road and railway transport. Statistically, nearly 44% of LC users have a negative perception of the environment, which consequently increases the risk of accidents. In France, for example, several dramatic accidents have occurred in recent years, involving buses with children onboard. Always, in France, when an accident occurs, the transport operator waits for a road user noticing the accident to use a very old telephone installed at the LC premises to warn the traffic center that something bad is happening at the LC and then the operator at the traffic center calls all the approaching trains to tell them to stop immediately without any additional information on what is going on. In the meantime, at the LC level, the situation is becoming worse, because of the wounded users and/or the blocked traffic. This is a “blind” way of managing LC incidents.

Given a target, the objective is to segment it into different regions based on optical flow of its pixels. To achieve that, we use a recursive algorithm that compares neighboring pixels to extract regions in which the pixels have a homogeneous optical flow. Given a pixel, the segmentation process consists in assigning this pixel to one of the existing clusters if the optical flow similarity constraints are verified; otherwise the pixel is assigned to a new cluster. The similarity constraint takes into account simultaneously the direction and the value of optical flow. The obtained clusters are then represented as rectangular boxes whose axes are parallel to the image axes. Only regions with a significant size are conserved. A significant size of the region is experimentally determined; it depends of the camera’s view around the LC area and the resolution of the camera. In our perception system, a region is considered that have a significant size if its width is above 20 pixels. The segmentation results are then adjusted so as to obtain regions with uniform size. The optical-flow-based segmentation results for a moving object tracked in an imaging sequence. The target is partitioned into multiple rectangular boxes representing the different regions with homogeneous optical flow. For ideal trajectories prediction (next step), each extracted region is considered by the center of its corresponding rectangular box. Hence, afterward, a trajectory is associated with each extracted region via its corresponding center.

The last stage of the model is to analyze the predicted ideal trajectory considering various sources of dangerousness.

The analysis is based on Dempster–Shafer theory, which allows combining danger induced by the different sources to obtain a quantitative measure of danger. Given a region center, we consider five sources of danger: position, velocity, orientation, acceleration, and distance between the predicted and absolute ideal trajectories. We can define a mass assignment for each source of danger. Considering the KF-based iterative process, four iterations are sufficient to track with high accuracy around 60% of the pixels belonging to a detected object. This rate allows performing robust object tracking.

A method to recognize the potential dangerous situations around an LC and in our life. Given a target detected by the tracking process, the proposed recognition method has three main steps: optical-flow-based object segmentation, prediction of ideal trajectories, and danger evaluation. The complete synopsis of the proposed danger recognition mode .There is two major kinds of methods to perform visual tracking. The first type is based on target representation and localization Blob, kernel, and contour tracking, and the second type of methods uses filtering Kalman and particle filters and data association.

II. LITERATURE SURVEY

The automatic railway gate control operation which is implemented in unmanned level crossings at remote areas by detecting a train approaching. To do that the gate is sensed by mean so if infra-red ray (IR) sensor placed on either side of the railway. This system uses microcontroller with the help of IR-sensors.

Automatic railway gate control is highly sensor based arrangements which is designed to use in almost all the unmanned level crossing in the train crossing system. The microcontroller forms the main unit of the system.[1]Road accidents at railway gate are a leading cause of death and injury worldwide. Surveys conducted by Indian Railway found that about 17% of total railway accidents in India is crossing accidents of which majority occurs at passive railway crossings. Primarily the road users have to wait a very long time before the arrival of train and even after the train are left. And secondly the chances of accidents that usually made by the carelessness of the road users or due to the time errors made by the gatekeepers is more.

Here comes the importance of automatic railway gate control system. In this project we detect the arrival of train and warn the road users about the arrival of train. If no obstacles found a green signal is given for the train to pass, otherwise a red signal is given to slow down. After the obstacles are cleared, the gate is closed and train is passed.

To make sure that the train is passed and reopen the gate, the system deals with two things. Firstly, it deals with the reduction of time for which the gate is being kept closed, secondly to provide safety to the road users by reducing the accidents. In the automatic railway gate control system, at the level crossing the arrival of the train is detected by the sensor placed near to the gate.

Hence, the time for which it is closed is less compared to the manually operated gates and also reduces the human labor. A classification of accident by their effects a microcontroller can be compared to a small stand-alone computer it is a very powerful device which is capable of executing a series of preprogrammed tasks and interacting with other hardware devices [2].

Railroad is one of transient mode which has an important role in moving passengers and freights. However rail road related accidents are more dangerous than other transportation accidents in terms of severity and death rate etc. Therefore more efforts are necessary for improving its safety. [3] Now a day's India is the country which having world's largest railway network. Over hundreds of railways running on track every day. As we know that it is surely impossible to stop, the running train at instant is some critical situation or emergency arises. Train accident shaving serious repercussion in term so floss of human life, injury, damage to railway property. These consequential train accidents include Collisions Derailments, Fire in Trains, and Collisions of trains at Level Crossings. In our country is a progressive country.

PROBLEMS OF EXISTING SYSTEM

- Manpower requirement is high.
- Lot of possibilities for train accidents.

III. PROPOSED SYSTEM

We can use this project in all railway level crossing levels. A collision avoidance system is an automobile safety system designed to reduce the severity of an accident. These systems either provide a warning to the driver when there is an imminent collision or take action autonomously without any driver input by braking or steering or both. Collision avoidance by braking is appropriate at low vehicle speeds e.g. below50 km/h, while collision avoidance by steering is appropriate at higher vehicle speeds.

- Railway track is controlled by sensors at every time.
- In our system continuously monitor the coach connection links.
- Accident safety is very high.

3.1 BLOCK DIAGRAM

Transmitter Block

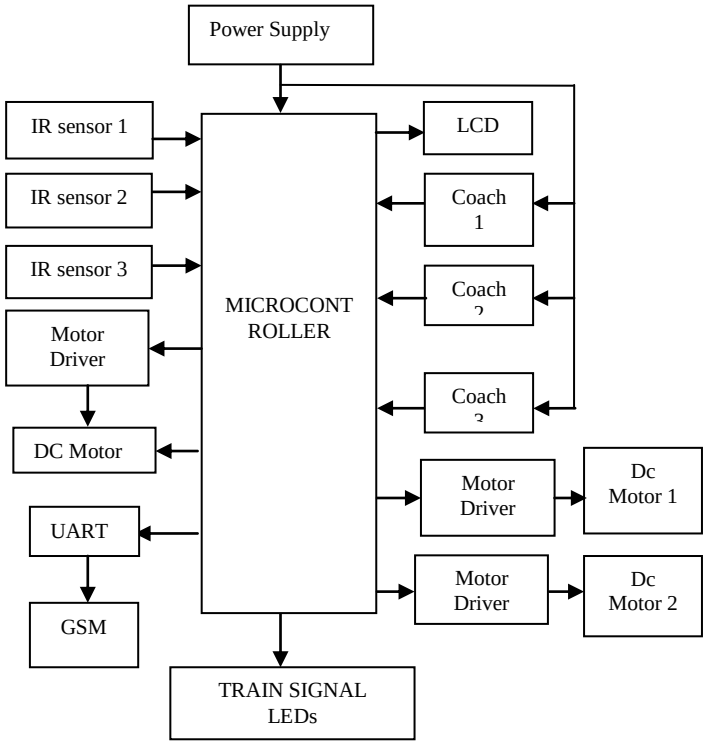

Figure: 3.1.1 Transmitter Diagram

Receiver Block

Figure: 3.1.2 Mobile Phone

3.2 MICROCONTROLLER

3.2.1. OVERVIEW PIC16F877A

Microcontroller PIC16F877A is one of the PIC Micro Family microcontroller which is popular at this moment, start from beginner until all professionals. Because it is very easy using PIC16F877A and use FLASH memory technology so that can be write-erase until thousand times. The superiority this RISC Microcontroller compared to with other microcontroller 8-bit especially at a speed of and his code compression. PIC16F877A have 40 pin by 33 path of I/O.

3.3 LIQUID CRYSTAL DISPLAY (LCD)

A Liquid Crystal Display is a thin, flat panel used for electronically displaying information such as text, images, and

moving pictures. Its uses include monitors for computers, televisions, instrument panels, and other devices ranging from aircraft cockpit displays, to every-day consumer devices such as video players, gaming devices, calculators, and telephones. Among its major features are its lightweight construction, its portability, and its ability to be produced in much larger screen sizes than are practical for the construction of cathode ray tube (CRT) display technology.

3.4 IR SENSOR

IR Sensor is a passive infrared sensor. It has two LED's one is transmitter and another one is receiver. An Infrared (IR) sensor is used to detect obstacles in front of the robot or to differentiate between colors depending on the configuration of the sensor.

3.5 L293D

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

3.5 GSM (Global System for Mobile)

Over 200 GSM networks (including DCS1800 and PCS1900) are operational in 110 countries around the world. In the beginning of 1994, there were 1.3 million subscribers worldwide, which had grown to more than 55 million by October 1997. With North America making a delayed entry into the GSM field with a derivative of GSM called PCS1900, GSM systems exist on every continent, and the acronym GSM now aptly stands for Global System for Mobile communications.

The developers of GSM chose an unproven (at the time) digital system, as opposed to the then-standard analog cellular systems like AMPS in the United States and TACS in the United Kingdom. They had faith that advancements in compression algorithms and digital signal processors would allow the fulfillment of the original criteria and the continual improvement of the system in terms of quality and cost. The over 8000 pages of GSM recommendations try to allow flexibility and competitive innovation among suppliers, but provide enough standardization to guarantee proper interworking between the components of the system. This is done by providing functional and interface descriptions for each of the functional entities defined in the system.

IV. HARDWARE RESULT DISCUSSIONS

When the kit is turned on the following figure appears. Figure 4.1 shows the picture of the kit when turned ON.

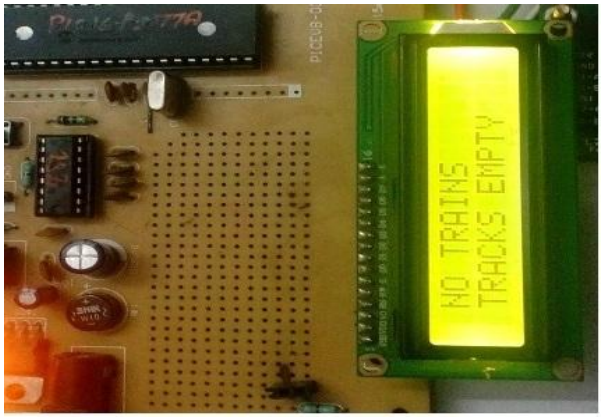

Figure: 4.1 Tracks Empty

When the train starts and all coaches are connected the LCD will display a message all coaches are connected.

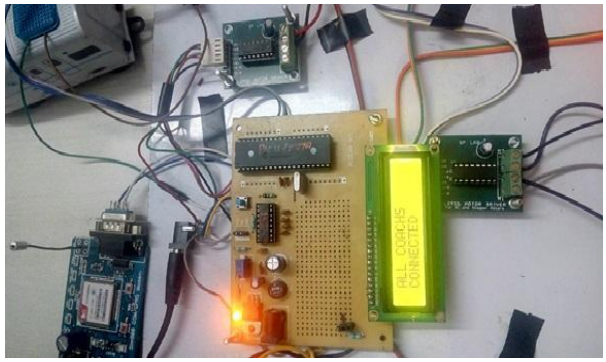

Figure: 4.2 Coaches are connected

When two trains passes in the same track the following process occurs

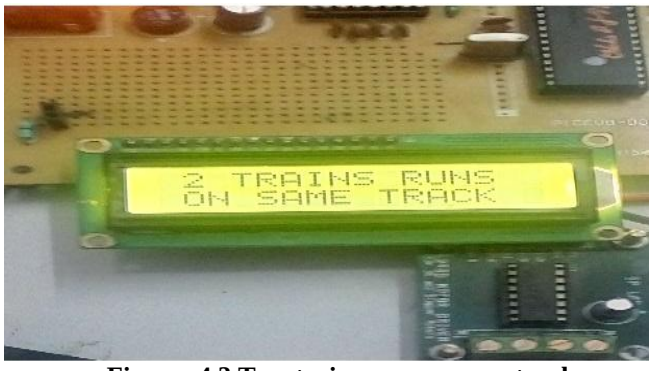

Figure: 4.3 Two trains run on same track

When the train is on the track, if any coaches are removed, then the train stops automatically. An alert message is produced as shown in the figure.

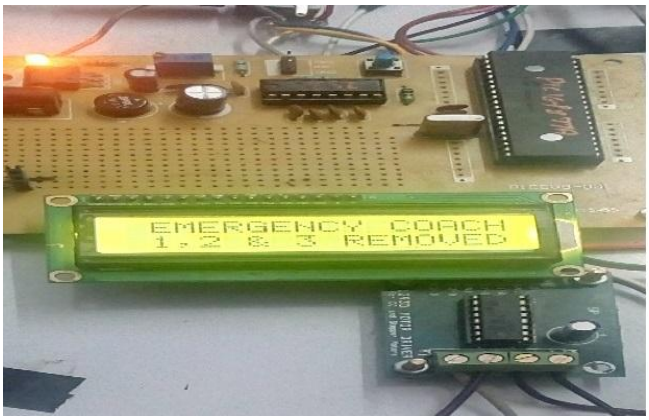

Figure: 4.4 Coaches removed

An alert message is produced as send to receiver (mobile) when coaches are removed from the train.

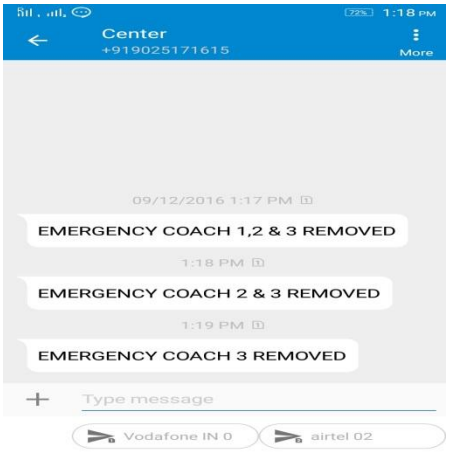

Figure: 4.5 Alert Messages

V. CONCLUSION

This system can contribute a lot of benefit either to the road users or to the railway management. Since the design is completely automated it can be used in remote villages where no station master or line men are present. Railway sensors are implemented in every train with simple mechanism. It is used to sense the arrival and departure of the trains when trains are arriving in same track and also mainly used to detect the coach links are connected or disconnected. It will intimate alert to messages to the personnel when coach links accidently removed. This system if two trains are arriving in same track, it can automatically clear the opposite track and divert the other train with manual control. The LCD display shows the status of the train coaches status and railway track status (Whether empty track or any obstacles are there). The system can also generate buzzer and light indicators while the train coaches are removed and trains arriving in same track. Now a day's automatic system occupies each and every sector of applications as it is reliable and accurate.

VI. REFERNCE

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